Third United Nations International Conference on the Peaceful Uses of Atomic Energy

A/CONF.28/A/859
NORWAY
February 1964
Original: ENGLISH

Confidential until official release during Conference

Abstract

IN-CORE INSTRUMENT DEVELOPMENT IN THE HBWR PROGRAMME

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The development of fuel channel flow and void measuring turbines, dynamic void gauges, heat flux measurement and boiling channel power measuring devices was initiated to support the experimental dynamics research programme at HBWR by permitting continuous dynamic measurement and comparison of in-core parameters during perturbation experiments.
With successful long term performance of this type of device, in-pile, the instrument development programme was diverted towards in-core protection and measuring devices for high powered test fuel elements operating at real heat transfer limits. Devices in this category which have been or are being evaluated with test fuel channels are the burnout detector, the gamma thermometer, central oxide thermocouples and instability monitoring.
In new dynamics investigations at HBWR in-pile channel flow perturbation devices will be tested in association with short-time-constant instrumented tubular metallic fuel assemblies.

In the process of testing past instrumented fuel assemblies, natural circulation steady-state hydraulics measurements have been made parametric in pressure, channel power, subcooling and axial flux shape and differences from both calculations and prediction from electrical loop data have been observed.

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Paper prepared and presented on behalf of the OECD Halden Reactor Project - a joint undertaking of the European Nuclear Energy Agency.